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## THE PREHISTORIC ORIGIN OF THE COMMON FOWL.\*

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It is a remarkable fact that ornithologists, as a class, are so ignorant of the bird which is beyond doubt of the most importance to the human race. The vast literature relating to the culture of the Common Fowl is seldom scientific in its treatment, and those archæologists who have written on its ancient history, or the anatomists who have analysed its structures, seldom show any wide knowledge of this species generally. Even Professor Newton, in his authoritative 'Dictionary of Birds,' is content to dismiss this important bird by the repetition of certain old phrases that are, in spite of their tenuity, quite misleading to the student.

The vague modern idea is that the home of the Fowl is in and near India, that it reached us *via* Persia, Greece, and Rome, and that it was not known either to the early Mesopotamians or the ancient Egyptians. We desire to present our reasons for differing from most of these opinions, and shall attempt to prove that the bird was well known to the earliest Egyptians and the Mesopotamians, and that the evidence relating to an Indian origin is more than doubtful.

\* Although *Gallus bankiva*, Temminck, is the best known name for this species, the strictly correct one in a matter of priority is *G. gallus* (Linné), and many authors have used *G. ferrugineus*, Blyth. In India it is known as the Red Jungle Fowl, or more often Jungle Fowl; and it is a noteworthy fact that in English-speaking countries it has no common name peculiar to itself, for Fowl, Hen, and Cock are often used in speaking of other birds. The plural Poultry is, of course, fairly definite.

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We find ourselves with such a mass of raw material that a full discussion of the distribution in time and space of the Fowl would take up far too much time. We shall therefore start our investigations at or about the fifth century B.C., when the bird was abundant throughout the known world, and work backwards from this date. Ornithologists have for so many years drawn their ideas of the Fowl's history from ancient Greek literature that it seems almost sacrilege to doubt these old authorities. Although the Greek writers have little information that could be used in the present discussion, we insert a few details here. Homer, for instance, mentions a man called "Alekttron," and this scanty note appears to carry the history of the bird back a long way.\* Aristophanes, who lived about B.C. 450, mentions the Cock once or twice, and refers to it (l. 833) as of "Persian parentage" (ὄρνις ἀφ' ἡμῶν τοῦ γένους τοῦ Περσικοῦ), and as an ancient ruler of that country (l. 483). He mentions also the *tetrao* (l. 882), and in a note to Rogers's edition of 'The Birds' reference is made to a passage in the Ninth Book of Athenæus (58), in which this *tetrao* is described as "about the size of a Rook (? — σπερμολόγω is the word), of a brick colour, mottled with divers spots and large stripes; it feeds on fruits, and when it lays an egg it cackles." Laurentius (who in Athenæus quotes the above description from the second work on winged creatures by Alexander the Myndian) calls this the "small *tetrao*"; he has a specimen of the "large *tetrao*" outside, and brings it in for his guests to admire. It is "like the Porphyryion . . . and from its ears it had wattles hanging . . . and a harsh voice."

Quite clearly we have here descriptions of the male and female of the Fowl passing as two distinct birds, and this example serves to demonstrate the unreliability of Greek ornithology. Laurentius, it may be added, is quite sure his *tetrao* is *not* the Persian bird of Aristophanes! Of course, every naturalist will know that the wattles and the curious habit of cackling after oviposition do not belong to any member of the present family *Tetraonidæ*.

\* Dr. Leaf, in his important edition of the 'Iliad' (1900), gives reasons for holding this word *Electryon* (Book xvii. 602) to be unconnected with the Cock (cf. vol. ii. 256, and also i. 294).

Although ancient literature is so disappointing, ancient art abounds with reliable contemporary information of the Fowl, and it is hard to explain the ignorance of such authors as the one quoted above. The British Museum collections of Greek, Roman, Phœnician, and other antiquities are very rich in portraits of the cock. We see admirable groups of cocks fighting; cock and boy playing together; cocks and hens feeding; cocks being pursued by Panthers (surely this suggests that they were more or less wild); cocks being offered as sacrifices, or carried in the hands of the old gods. The student unable to examine the British Museum collections will find many excellent illustrations in such books as H. B. Walters's 'Terracottas in the British Museum,' and 'Catalogue of Bronzes in the British Museum'; B. V. Head's 'Coins of the Ancients,' &c.

It is a curious fact that the figure of the Cock does not make its appearance in Greek art until the seventh century B.C.—at least, we have not been able to find undoubted portraits of the bird. In the earliest Mycenæan pottery (from about B.C. 3200 onwards) animal forms are unusual, and generally too crude to be identified. When the Cock appears in the art of the Eastern Mediterranean it does so in company with traces of Oriental influence. This might suggest that the bird was introduced from the East at the same time, but there is more reason to believe that the art and not the subject-matter of the art was imported. It must be remembered that these early portraits of the bird are undoubtedly drawn from life (as in fig. 5 on p. 9, which is copied from a vase found near Athens), and the variety of compositions in which we find it pictured, and especially its connection with religious and mythological subjects, hardly agree with the possibility of the creature being a novel introduction.

We have not been able to measure the full importance of the Cock in Persian history. Aristophanes makes one of his characters say ('Birds,' l. 506):—"There is proof that in former days birds were the kings of men; first I will produce the Cock, who ruled Persia before the days of Darius or Megabazus, and still from that archaic rule he is called the Persian Bird." It seems likely, indeed, that the appearance of the Cock in western art had some connection with the influence of Persia. Aristo-

phanes never refers to it as actually introduced from Persia, but only as being of Persian parentage, and that it was abundant in his day is proved by the familiar manner in which he connects it with "tradesfolk of every kind who jump up at daybreak and commence work when they hear its voice."

The material at our disposal enables us to say that about the seventh century B.C. (when for all we know to the contrary India was not in direct communication with other nations) the Common Fowl was well known from the Atlantic through Sardinia, Italy, Sicily, the whole of Northern Africa, Phœnicia, Mesopotamia, Persia, China (it first reached China in B.C. 1400), and Japan.\*

Care must be taken not to misunderstand the words Fowl and Hen appearing so often in the Old Testament, for these may be but translations of the Greek *ὄρνις*. The Talmud (dating from about B.C. 200 onwards) has several most curious references to our bird, and, as the work is a repository of still older traditions, it possesses some value to the student of ancient history. It is the authority for the translation of the Hebrew *Burburim abusim* (1 Kings v. 3) into "fattened hens"—that is, the Common Fowl. In another place (Shab. 35 b.) it says that as the hen sleeps in elevated places, usually over chimneys, the lower eyelid overlaps the upper, in order to protect the eyes against smoke! But for further information the reader must turn to Dr. Ginzberg's article in the 'Jewish Encyclopædia,' iv. p. 138.

Some commentators have held that Nergal, the idol of the men of Cush (2 Kings xvii. 30), had the form of a Cock, but the probability is that a well-known Eagle-headed Assyrian deity has been confounded with this idol.

It is, however, to ancient Egypt that we must turn for our best knowledge of the ancestry of the Fowl. Some of the Grecian and Roman written history, as that which tells us that in Egypt "Yellow Cocks" were sacrificed to the jackal god Anubis, is not worth very much, for as a matter of fact there were no such sacrifices ever made. A little more attention can be

\* After carefully examining the statements for the occurrence of the Cock in ancient Mexican art, we do not hesitate in saying that a mistake has been made. A bird figured in Le Noir's great work has so changed under the pencil of the lithographer that it certainly resembles a Cock, but in the original French text it is called an Eagle.



given to the historian Diodorus Siculus, who has left us a long account of Egypt, in which he mentions (*Biblio. bk. i. vi.*) the methods of artificial incubation in use in the country during his own times (circa B.C. 60). He says they "keep poultry and geese, but, not content with the ordinary way of breeding, . . . force the young out with their hands with so much art and skill that it is done as effectually as by Nature herself." Sir J. G. Wilkinson, in his charming but absonant '*Ancient Egyptians*,' accepts Diodorus without any hesitation, and he discusses at some length this business of artificial incubation, which is still flourishing in Egypt to-day. Both Greeks and Romans were peculiarly careless observers of biological subjects, and, although no doubt the old Sicilian was correct in the main, we do not wish to build on this evidence alone, more especially as he gives us no facts whatever concerning times before those in which he lived.

In later times, when Egypt became more under the influence of the nations towards the north, the Cock becomes a frequent figure in the alien art of the Delta, and we have seen many examples dating from about the sixth or seventh centuries B.C. Yet, on the other hand, Egypt must have influenced Europe in return, for in the Gem Room of the British Museum there is a small jasper seal (taken from a seventh century B.C. grave at Tharros, in Sardinia, then a Phœnician colony) bearing the figures of two men in Egyptian costume, a lotus plant, and a Cock. About 500 B.C. a boy playing with a Cock was a favourite subject with the artists in terracotta of the Greek and Phœnician colonies around the mouths of the Nile, but it is impossible to learn the exact root of the bird in these countries, for they were obviously open to the influence of many nations.

The ancient hieroglyphic writing of the Egyptians consists of pictures of animals, plants, and other objects; their number is very large, and at least five hundred were in constant use. During the very earliest times these signs were nearly all quite recognizable portraits, but at last they became conventionalized characters, and finally lost their first significance. There was also an alphabet, and in this the sound of U or W was represented by the figure of a chicken (*cf. figs. 3 and 4*). Heinrich Brugsch in his great work on this ancient language

('Hieroglyphisch-demotisches Wörterbuch,' i. 238) distinctly terms this figure to be that of the young of the Fowl—"das Hühnchen." Brugsch was certainly one of the very highest Egyptological authorities who has ever lived, but he was no ornithologist, and we think it will be wise to strengthen his opinion by evidence gathered from other sources.

We have examined carefully a vast number of the original signs, drawn or carved by scribes and sculptors from the earliest dynasties (B.C. 4400) to the time when the figure became a mere convention and finally disappeared (about the end of the Roman Period). Two typical examples have been figured for the benefit of those who have no acquaintance with the hieroglyphic writings. Now, it is impossible for any ornithologist to believe that the bird is not the young of some member or other of the Order *Gallinæ*, or Game-birds, and we cannot do better, after being settled on this point, than take the likely species in detail. There can be no question that the bird-life of the Nile Valley of to-day is far different from that of five or even two thousand years ago, but, with the exception of the status of one or two species that have nothing to do with the present question, we have no knowledge of the extent or the nature of these changes, and there are reasons for believing that certain kinds have remained stable.\*

Of existing Game-birds in Egypt, the Sand-Grouse—known to the ancient Egyptians as "The Skulking One"—comes first on our lists. One species (*Pterocles exustus*) is to-day a common bird, and was probably as common in the ancient times, for we see its portrait frequently on the monuments. The young of the Sand-Grouse, however, differs very considerably from the figures of our chicken, and can be passed over at once. The Francolin has been recorded for the Delta, but on doubtful authority, and we have no trace of it on the monuments. The same can apply to the Seesee Partridge (*Ammoperdix heyi*), and the Andalusian Hemipode, both of which, however, have occurred in modern Egypt as rare stragglers. The only other Game-bird known in a wild state in the Nile Valley (of course, we confine

\* Cf. Shelley's 'Birds of Egypt' for details of the ornithology of the Nile Valley of to-day.

ourselves to those parts of Africa inhabited by the dynastic Egyptians) is the Common Quail (*Coturnix communis*).

Unless the U sign be the figure of some bird that is now extinct—and we have not the slightest reason for thinking this to be the case—we are safe in ascribing it to the young of one of two species, the Quail or the Common Fowl. There are many reasons for dismissing the first-named bird. Although common in Egypt in winter, and on migration in spring and autumn, the great majority of the birds cross the Mediterranean to breed; few remain in the Nile Valley during the nesting season, and most of these are found towards the north of the country. It is quite clear that the figures of the earliest dynasties must have been made by scribes who were familiar with the originals. The chicken was one of the commonest signs, and is always wonderfully true to nature, but it is hard to imagine how the scribe could get his knowledge from so skulking a creature as the young of the Quail, especially when we remember that the nesting period of wild birds is limited, and that the space of two or three days would spoil the young bird for the use of the artist desirous of drawing a down-covered chicken. The Quail does not (so far as our experience carries us) appear on the monuments of Egypt, nor have we met with it in the literature, and we think it need not be considered in connection with the U.

Personally, we have not met with any portrait of either sex of the adult Fowl in the hieroglyphics. A doubtful sign that is a variant of the U may perhaps be intended for a hen, but this solitary occurrence is too vague to be useful. Wilkinson ('Ancient Egyptians,' i. 153) has described amongst the tribute paid by the people of Kufa, from the countries around Palestine, to Thothmes III. in B.C. 1550, a Rhyton, or drinking cup, fashioned in the form of a Cock's head; and the cautious way in which he approached the identity of another bird described and figured on the previous page leads us to take his authority for this early and important example.

We have not been able to learn of more than two figures of the adult Fowl in the most ancient Egyptian art; both these are of the pre-Dynastic Period, and are rather doubtful creatures, but we append careful copies taken from photographs, and hope to show that we are not mistaken. The omissions of

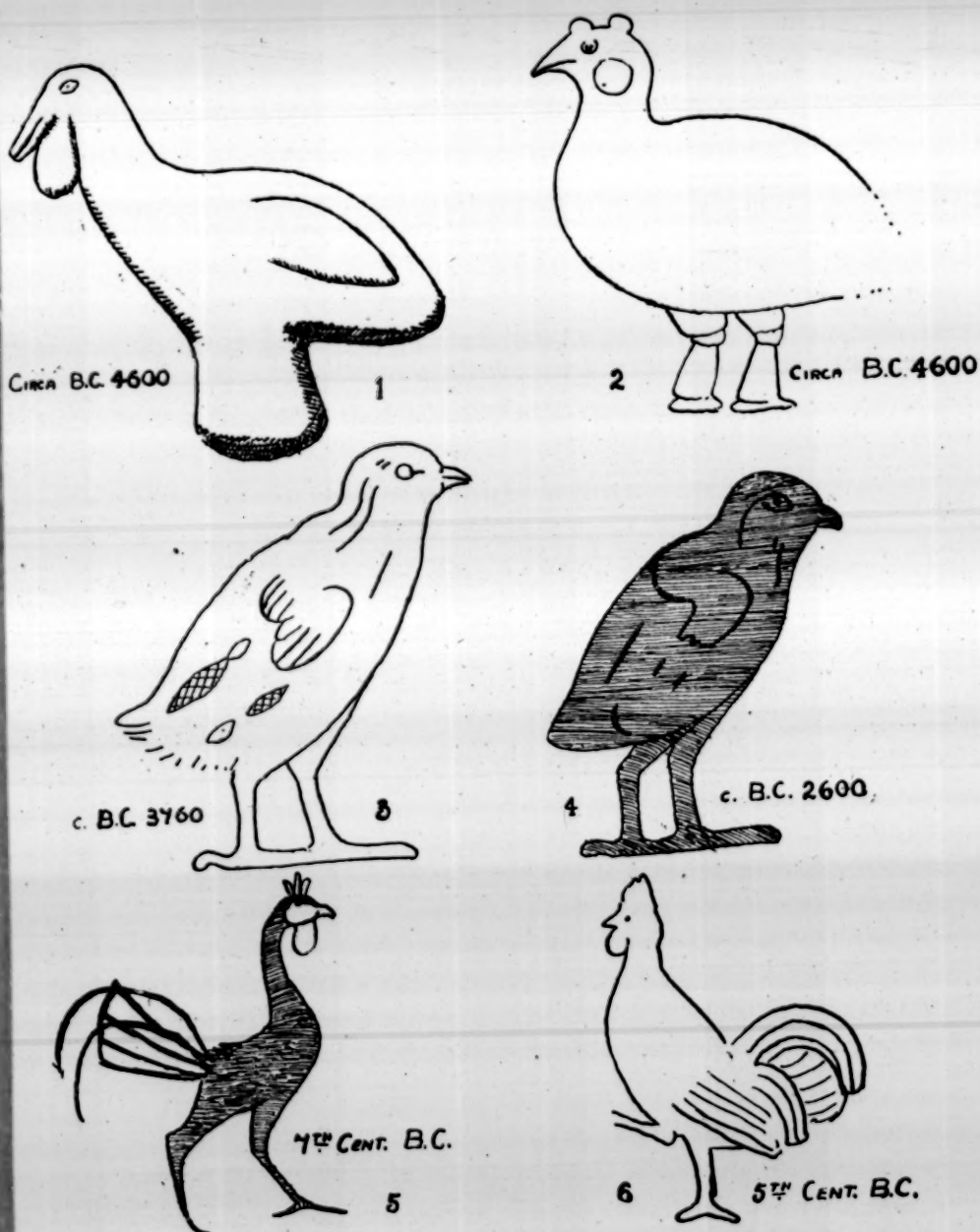
common birds from the monuments are most peculiar. Even so striking a species as the Flamingo has only a very few times come to our notice, and the adult Pigeon has not been seen at all. There is a common sign—TCH A—that shows a nestling bird sprawling on its breast, beating its naked wings, and clamouring with wide-open mouth. We now suggest this is a young Pigeon. (A writer on the Egyptian origin of the alphabet actually called this bird a Duck!—'Recueil de Travaux,' tom. 23, p. 154.) Adolf Erman certainly called the UR sign—meaning "great," "old," and the like—the Dove; other Egyptologists have thought that it was a Sparrow, and the general opinion seems to lean towards the Swallow, but after comparing a good many examples we are inclined to believe that it cannot be anything else than the Pratincole (*Glareola pratincola*), still a common bird in Egypt.

Our first figure was held by its discoverer to be that of a Pelican, a finding with which few ornithologists are likely to agree. It was found at Hierakonpolis, and belongs to a period termed by Prof. Petrie "Dynasty O"—that is, the one previous to the so-called First Dynasty. The date would thus be before B.C. 4400. The figure (fig. 1) is a sort of "statuette" of green glazed ware, and is figured photographically and in line in Quibell's 'Hierakonpolis,' vol. i. pls. xxi. and xxii. Many other birds possess crests, but as the Common Fowl was peculiar in the possession of wattles, it is easy to understand how the artist insisted on figuring these to give character to his model, and we cannot be far wrong in thinking that this old artist or potter was inspired by the Common Fowl and by no other bird. In passing we may say that all the pre-dynastic remains found in Egypt are made after Asiatic archetypes.

The second example belongs, curiously enough, to much the same period and to the same neighbourhood—Abydos, on the west side of the Nile, opposite Thebes. Some years ago there was a find of several "slates," with pictures relating to battles fought at or before the united monarchy under Menes in B.C. 4400. The known examples were described and well figured by Mr. F. Legge in the 'Proceedings' of the Society of Biblical Archaeology, vol. 22, pp. 125-39 and 270. Reference may be made to the accessible 'History of Egypt,' by Dr. E. A. Wallis Budge



(vol. i. pls. 36 and 37), where one of these curious objects is figured and described. The bird now presented (fig. 2) has been



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carefully drawn from one of the excellent photographs accompanying Legge's article. As an ornithological illustration it

does not earn a high place, but we can draw attention to, first, its feathered feet; secondly, the presence of what is surely a wattle under the ear; and, finally, the suggestion of a comb on the head. When we have considered the other animals depicted on these "slates" (the Giraffe is one), and when we know how the "slate" would influence the treatment of the subject by the artist, we feel pretty confident in ascribing this nameless bird to *Gallus bankiva*. It must be remembered that the chicken sign occurs frequently on these pre-dynastic remains.

At this point we may review our position. The evidence relating to the first seven hundred years B.C. around the Mediterranean needs no discussion. In Egypt we have the sign of the chicken from the earliest known times. We give our reasons for thinking that the bird is the young of the Fowl, and not that of the Quail; we know the bird was present in Egypt in later times, a few centuries B.C.; and we have the evidence from pre-dynastic remains that the adult bird was then in existence. Having thus carried the history of the Fowl back prior to B.C. 4400, the next step is to inquire how it reached Egypt.

Egyptologists have long since proved that the dynastic Egyptians were not autochthones, but invaders from Western Asia. The subject has been discussed in an erudite and interesting manner by Dr. E. A. Wallis Budge in his 'History of Egypt.' The date of the invasion was about B.C. 4400, and, if we allow a couple of centuries for the migration, we get back to the date B.C. 4600 as that in which the invaders left Mesopotamia. They carried their language with them and (what is more to the present study) carried also several Asiatic plants and animals. The Camel, Horse, and Sheep offer one or two puzzling points. A figure of the Camel was found in a pre-dynastic grave, but no mention is made of the animal in the hieroglyphics until the Eighteenth Dynasty (B.C. 1300), when it is referred to under the Semitic name of *Kamaal* in an ancient Egyptian work entitled 'Travels of an Egyptian.' The writer of this papyrus records seeing the animal during his visit to the land we now know as Palestine. The Horse also appears for the first time in the hieroglyphics of the Eighteenth Dynasty, during which period it was brought from Mesopotamia.

The Sheep appears to be identical with the "Ram of Khenmu," which appears in the writings for 2500 years, long after the animal itself had died out. Some authors have considered it to be a species of native Sheep long since extinct, but it is more reasonable to suppose that it was but an introduction from Asia, for we have no evidence pointing to the existence of any species of Sheep in Africa other than the anomalous case of the Barbary Sheep in the north-west of the continent.

Both wheat and barley are unquestionably of Asiatic origin, and these were unknown in Egypt until the time of the invasion of six thousand years ago. Prof. Schweinfurth and M. de Morgan have placed this matter beyond doubt, and De Candolle (*Hist. Cult. Plants*) thinks that the flax was introduced also. Apart from this biological evidence we may use the fact that peculiarly formed mace-heads are found in the early dynastic tombs. Now, these implements are not to be distinguished in any way from those found in similar situations throughout Babylonia. In Budge's '*History*,' vol. i. there is a figure of one of these weapons, and amongst the details of the carving we get the sign of the Chicken.

Although it is quite certain that the ancient Egyptians came from Babylonia, we are not so certain as to the original home of the great parent race, although we have every reason to believe it was in some part of Central Asia. They are said to have settled in the country surrounding the Tigris and the Euphrates so far back as B.C. 8000, and are said also to have come from the north. Perhaps the true home of the Fowl was in Central Asia, but the present writers' knowledge of Mesopotamian language and history is too slight to enable them to trace the Fowl beyond B.C. 5000, and at this date we may leave it as being under domestication in the vicinity of the Tigris and the Euphrates.\*

We know absolutely nothing of India at this period. It is certain that it was peopled by immigrants from Western and Central Asia, but the date is not even approximately known. The earliest history of the commerce between India and the western nations has been carefully gathered by Mr. J. Kennedy ('*Journal*' of the Royal Asiatic Society, 1898, pp. 231-288);

\* Layard's '*Nineveh*,' ii. 395, includes a figure that must be either Cock or Pheasant. The original work, if available, would be well worth close examination.

this writer brings evidence to *suggest* that traffic between Babylonia and India was in existence between B.C. 700 and B.C. 300. It is true he remarks that for all we know to the contrary it commenced centuries before this date, and, again, it may not have begun until B.C. 300 at the earliest. About the seventh century B.C. we find a marked Oriental influence in Greek art. The purely eastern *Swatsika* design (a sort of cross with the end of each arm bent at right angles) now appears on such objects as vases, and the figure of the Cock becomes very common. It is just possible that this artistic change marks the date of the commencement of intercourse between India and the western nations, but the whole question is extremely vague.

One thing is clear, however: seven thousand years ago the Fowl was known in Mesopotamia, yet it did not reach China until four thousand seven hundred years after this date, and is not known in India until many centuries afterwards. We think this huge gap of time disposes at once of the theory of an Indian origin for the bird. The actual evidence for the ornithological view of to-day that the Fowl originated in India is extraordinarily flimsy, and, on analysis, in no way convincing. The main point seems to be that it is found in Eastern India in a thoroughly wild state, but so far as we can learn, the question of it being feral in these places has not been even mentioned by ornithologists. It is a matter of common knowledge that perfectly wild *Gallus bankiva* exist in many tropical and subtropical parts of the world, where their origin can be traced back to recent introduction. After a few generations of liberty the bird becomes perfectly indistinguishable from the Jungle Fowl of India. Some naturalists have laid undue stress on the different voices of these feral birds, but it would be unwise to build too much on this, for many years ago Captain W. Allen (Narr. Niger Ex. ii. p. 42) described how the birds introduced by shipwreck to an island off the West Coast of Africa, and become quite wild, had "a cry quite different to that of the domestic fowl." It is most unfortunate that ornithologists have been so unready to include feral species in the compilations of faunas; in England we find that such birds as the Canada Goose, common and perfectly wild in a county, almost or quite ignored because they are not indigenous, and we see the same thing in searching the literature



of *Gallus bankiva*. It is thus difficult to learn its exact status as a wild bird, but we have records for every continent except Europe, and should be not in the least surprised to hear of feral colonies even here. As a rule, however, it becomes best established on subtropical islands.

Irwin, in his "Memoir of Afghanistan" (J. A. S. B. viii. p. 1007), says that "the Common Fowl is found in its wild state in the whole of Turkestan, especially Balkh." Blyth ('Ibis,' 1867, p. 156) commented that "surely this is a mistake"—because, of course, he believed that the bird could hardly be wild except in what, after the manner of all other ornithologists, he held to be its native home. The present writers have strong reasons for believing that the Fowl was carried to Mesopotamia from Central Asia, and although the evidence is as yet too scattered for publication, the opinion may be given in connection with Irwin's interesting note.\*

It may be well to give the present distribution of *Gallus bankiva* from an ornithological point of view (Ogilvie Grant, Cat. Birds Brit. Mus. vol. xxii. p. 346):—"The jungles of North-eastern and parts of Central India, ranging south through the Malay Peninsula, east through Siam to Cockin China and Hainan; it also occurs in a wild state in Sumatra, Java, Lombok, Timor, Celebes, Palawan, and the Philippines." In 'Game Birds,' a subsequent work by the same author, it is suggested that the Fowl may be feral in the last-mentioned localities. As we have said, it occurs also, and equally wild, in many other parts of the world. We cannot find any records for the west coasts of India. Here we get the Grey Jungle Fowl (*Gallus sonnerati*) that is apparently quite wild, and seems never to have been domesticated; it differs very much from *G. bankiva*. The present distribution of the Common Fowl, together with our knowledge of Indian commerce with western nations, certainly assists in dismissing all ideas of an Indian origin.

As is usual in such researches as the present, geology gives us but little assistance. We find some mention of bones being taken from the *Terramare* beds of Italy (cf. Keller, 'Lake Dwellings of Europe,' i. 389), but Prof. Rutimeyer, with greater

\* Darwin, in his 'Variation under Domestication,' i. 249 ff., has much to say on the origin of the Fowl.

zoological knowledge, after examining nearly all the available material, thought that the species did not occur. In Europe truly fossil remains have been recorded by good authorities from the following localities and formations:—Puy-de-Dome, France (Upper Pliocene); Pikermi, Attica (Lower Pliocene); and from the Cavern Deposits of the Lahn Valley in Germany (cf. Lydekker, 'Fossil Birds,' p. 142). None of these remains of *Gallus* were actually ascribed to the species *bankiva*. We have not learned of any fossil remains of the bird from India, or, in fact, from any part of Asia; but this is negative evidence of little value.

We conclude by repeating that we have not been able to find the slightest scrap of proof that the Common Fowl originated in India, and we bring evidence to show that it was present in Babylonia in the fiftieth century B.C., that it was introduced to Egypt about B.C. 4600, and to the Mediterranean countries from Mesopotamia at some unknown but very early date. The evidence appears to indicate that the bird was introduced to India by invaders—a race known as Dravadians—from the north-west at an unknown date, and that the species is now feral there, exactly as it is in many other parts of the world.

We are safe in assuming that the original wild stock is long extinct, as we know is the case with the Horse, Camel, wheat, cherry, and many other forms of life. Yet we know that both the Horse and the Camel are to be found perfectly wild in countries to which they are certainly not indigenous. The Horse is wild in Australia and America, descended from animals escaped from European colonists, and, as Mr. Abel Chapman has described (in his 'Wild Spain'), the Camel may even be found wild in Europe on the marismas of Spain.

The figures illustrate several of the more important forms in which the Fowl appears in ancient art. Numbers 3, 4 (Egyptian art) and 5 (Grecian art) are drawn direct from actual specimens in the British Museum; 1 and 2 are from photographs of the pre-dynastic Egyptian objects described in the text, and 6 is copied from an illustration of a Phœnician sarcophagus in Rawlinson's 'Phœnicia' (p. 195). In every case great care has been taken not to distort or exaggerate the critical points in each figure.

# NOTES FROM THE MILLPORT MARINE BIOLOGICAL STATION.

By RICHARD ELMHIRST, F.L.S.

## OBSERVATIONS ON THE BEHAVIOUR OF FISH.

WHEN fish are caught and brought into captivity they are very wild and shy and their behaviour is very different from that of tame fish which have lived in aquaria for several months; it is interesting to trace the fish's behaviour between these two extremes. Most fish have an instinctive\* fear of all moving objects above a few inches in size other than members of their own shoal. Saithe (*Gadus virens*) often gather in dense shoals among and around the piles of Keppel and other piers in this district, yet massed together as they are they detect and avoid anyone creeping on the cross-piles, and are not easily caught by means of a landing-net. The reason for their fear of strange objects, both in and out of the water, is not far to seek. Anything coming in among them may be a diving Shag, Cormorant, or Guillemot, a Porpoise, Whale, or some large predatory fish. Shags account for a great number of fish—for instance, one which had been feeding near this station for about an hour and a half when shot contained seven *Gasterosteus spinachius*, forty-one *Gobius flavescens*, half one *Labrus bergylta*, seven inches long, one *Ctenolabrus rupestris*, and half a five-inch Saithe; another specimen, shot some weeks later, contained six *Pholis gunnellus*, two *Labrus*, species unrecognizable, seventeen *Gobius*, and some Gadoid remains. When small shoals of Saithe or Lythe (*G. pollachius*) are playing at the surface, a Gull passing close over them causes the shoal to break up and go down, often with considerable splashing in their endeavours to get away quickly;

\* "The discrimination between reflex and instinctive actions is chiefly conventional. In both cases we have to deal with reactions to external stimuli or conditions. But while we speak of reflex actions when only a single organ or group of organs react to an external stimulus, we generally speak of instincts when the animal as a whole reacts. In such cases the reactions of the animal, although unconscious, seem often to be directed towards a certain end."—Loeb, 'Comparative Physiology of the Brain,' p. 177.

such a shoal avoiding a bird may give alarm to a neighbouring shoal some twenty or thirty yards away, which could not possibly have been frightened by the shadow or have seen the bird itself. This fear of birds and other objects overhead is probably due to the habits of Gannets.

Similarly, a Porpoise coming in among a shoal of fish may cause many of them to jump right out of the water in their efforts to escape; I have seen Saithe about fourteen inches long jump three to four feet out of the water when frightened by a Bottle-nosed Whale. So, being naturally afraid of strange moving objects and shadows, newly caught fishes avoid people in front of the tanks, dash wildly about, and often knock themselves against the rock-work or glass front in their efforts to escape from these strange objects, and finally settle in the darkest corner available, or, in the case of a white glazed earthenware tank, at the bottom.

In a few days the fish find that the presence of people is not connected with any danger to themselves, and begin to come out into the better lighted parts of their tank, and soon lose all fear of them, but a dipping-net or stick in the water will cause them to dash about wildly, and sometimes even to leap right out of the water. This habit of leaping out of the water to escape pursuit is very common among fishes, but is generally a very indefinite effort, and I have failed to notice any marked attempt to dodge by leaping to one side except in the case of the Whale and Saithe mentioned above. During this stage of losing their shyness the fish are greatly alarmed by any sudden movement, such as putting one's hand quickly up to the front of the tank, or waving a handkerchief before them, but they soon get used to such tricks. During the first few days of their captivity they do not touch any food, and when they see shelled mussels or other such food falling through the water, they dart away from it, and it falls to the bottom, where some of them may find it later; or possibly in avoiding one piece a fish may touch another piece with its nose, detect that it is edible, take it and begin to look for more. Sometimes a week or two may pass before hunger overcomes their natural fear of falling objects. Now nearly all of our Gadoids are caught on white flies, and so cannot connect the smell of mussel, &c., with their late experi-



ence of a hook and the subsequent ordeal of being landed, handled, and brought into the aquaria. Besides which, fish do not learn readily from a single experience; for example, Day records a Perch being taken with its own eye as bait,\* and many similar instances are known. Pike† or other fishes take a long time and many knocks to realize a glass division across the tank in which they live. Fish, if hungry, will repeatedly try inedible or nauseous objects before finally refusing them; I have watched wild 3-spined Sticklebacks take bits of water-logged wood, &c., several times before giving them up. In experiments on feeding captive fish with Nudibranchs at Port Erin‡ and elsewhere, it was found that the same fish would try distasteful things time and time again. I have found the egg-masses of *Loligo* particularly distasteful to fishes. In experiments of this kind with tame fish, it is necessary to make considerable allowance for the fact that they feed by sight, and have learnt to take everything that is thrown in to them; because, after several weeks in the tanks they learn to recognize the action of putting food into the water, and can even associate the probability of food with the presence of a tray in one's hand, so that one has only to appear with the food-tray and the fish all come towards one, move about excitedly, knocking their noses against the glass, and making snapping movements with their jaws. If they are very hungry, they will behave similarly when one is only passing the front of the tank. Later they can associate the presence of somebody working by the mussel-tank, at the opposite side of the tank-room, with the probable occurrence of feeding, and one has only to go there for a few minutes for them to show their usual interest in what one is doing. By this time some of the fish will come up to the surface of the tank when anyone of those who usually feeds them gets up to regulate the circulation of the water, and will feed from one's hand or bite one's fingers. Some of them become so tame that they will come to one's hand, apparently without desiring or expecting food, and lie in it, particularly if tickled or stroked gently. An easy method of removing tame Saithe from a shallow tank is by "guddling,"

\* 'Fishes of Great Britain and Ireland,' by F. Day, vol. i. p. 5.

† 'Mind under Water,' by R. Jeffries.

‡ 'Fauna of Liverpool Bay,' Report iii., pp. 150-163.

that is, passing one's hand slowly under them and forward, tickling gently, until a good grip can be obtained round the shoulder. When fish are as tame as this they have lost, at any rate temporarily, their instinctive fear of many things, and acquired new habits. The main factor in bringing about this change is their inordinate love of food, for fishes will gorge themselves to a state of helplessness if opportunity occurs. It is sometimes said that performing seals, horses, &c., are trained by absolute hunger and thirst. I doubt that, and do not think that such extremes are necessary when one considers how much a well-fed dog can be taught to do for the sake of tit-bits. In many of these cases with the higher vertebrates there is surely some telepathic or similar influence at work between the trainer and the animals.

The case of such fish as Wrasses (*Labrus*) is rather different; they do not live in shoals, but hunt singly over the larger seaweeds\* for molluscs, or attack even fairly large crabs which come about their own special area of rocks. The food of the Ballan Wrasse (*L. bergylta*) consists chiefly of *Littorina*, *Lacuna*, *Gammarus*, *Idotea*, and larger crustaceans, such as *Hyas* and *Carcinus*. Such fish, after a few days in a tank, naturally dash at the mussel, &c., falling through the water just as they will at fishes† or other intruders. They like their food alive, or at any rate moving, and will often circle round a piece of mussel and not touch it until a stray current causes it to move slightly. Flat-fish at first are afraid of food falling through the water, and will dart away from it and bury themselves in the sand, allowing the food to lie until night. However, after a few months in captivity they, too, will dart up at food thrown into the water, and in time rise and become excited when one is working by the mussel supply tank. These fish—Saithe, Lythe, Wrasses, Flat-fish, &c.—can then detect one's actions outside the tanks at a distance of twenty-five feet, which inclines one to think that they are not so short-sighted as is generally supposed.‡

Newly captured fish, if put into a tank with tame ones, become tame much sooner than a batch of wild fish kept by themselves. Fish can show considerable emotion by their

\* 'Journal of the Marine Biological Association,' vol. i. p. 242.

† 'Zoologist,' 1909, p. 202.

‡ 'Journal of the Marine Biological Association,' vol. i. p. 242.

expressions, despite having "immovable eyes and a fixed osseous face."\* When expecting food, they display considerable vivacity; when being chased by larger fish, their whole appearance and actions are suggestive of fear. I have seen a Cobbler (*Cottus scorpius*), of a bright red colour to match *Melobesia*, jumping, quivering with excitement, erecting and spreading his magnificently spotted fins before a more sombre-coloured female, his colour alternately growing dull and bright meanwhile; some of this change of colour was probably due to alterations in the incident angle of light or vision.

During the end of August, September, and often later, there are large shoals of small Herring, about two and a half inches long, all over this district; their presence is generally indicated by a screaming flock of Gulls and their allies, who destroy the fish by thousands. If one rows out to such a place one finds the water glistening with the scales of the young Herring. Besides the birds, Whales, Porpoises, and other fish are continually decimating these shoals. The Bottle-nosed Whale follows them, rises right through them, and must catch hundreds at a time; I am told that incidentally they sometimes catch a Gull or two as well, but the Gulls are wary, and detect the Whale very quickly, and rise screaming just before him. These young Herring are often packed in dense, almost solid, masses. Four years ago I caught with two dips of a net eight inches wide and four deep one hundred and sixty-one young Herring from one of these packed shoals.

The colours of fishes vary, generally according to their surroundings, becoming light on a light background, and dark against dark. I find that fish kept in the dark become pale, whatever the nature of the background; Saithe, Cobblers (*Cottus*), and Gunnells (*Pholis gunnellus*) gave marked results, but Wrasses (*Ctenolabrus* and *Labrus*) did not make such an obvious change. On examining the fishes in the tank-room at night I then found that these species regularly became paler at night; the Pogge (*Agonus*) and the 3-spined Stickleback also showing the same change. Wrasses again showed less change, and I could not detect any change in Conger. This agrees with

\* 'Journal of the Linnean Society,' vol. xv. F. Day on "Instincts and Emotions in Fish."

the well-known fact that Salmon, &c., from dirty water are often pale and very silvery. One would rather expect that darkness would give rise to the same stimulus as a dark background, and the reflex would be an expansion of the chromatophores, or colour-cells, and so a darkening of the body. Perhaps in darkness there is no colour suggestion and the chromatophores receive no stimulus, and their contraction indicates a state of rest. This paleness at night or in the dark agrees well with the general rule of dull colours for nocturnal animals. Fishes which have died from suffocation, due to foulness or lack of oxygen in the water, are nearly always very pale; fishes which die at night are paler than those which die in daylight. On the side on which a freshly killed fish is laid the chromatophores contract and it may become almost white. If a freshly killed fish is laid on a grating, the lower side, after a while, will be found to be banded—pale where the bars of the grating pressed and dark elsewhere. If too long a time is not allowed to elapse and the fish is moved, so that the dark bands lie on the bars and the pale ones between them, then the chromatophores will react and the pale areas will darken, and *vice versa*, though not to such a marked extent as at first. This second reaction may be possible about forty minutes after death in a Cod.

Mr. Cunningham has made similar observations, and has shown that this paleness at places of contact with other objects, which explains the marbled appearance of fish which have been packed for market, is due to pressure, and not to the exclusion of light, for on laying a glass slip on a piece of fresh fish "the chromatophores under the cover-glass contracted, while those in the uncovered skin remain expanded."\* The chromatophores, then, may remain alive after the death of the fish to which they belong, and retain their ability to respond to physical irritation; they also respond to chemical irritation. In December, 1911, I took some pieces from the side of a Cod, three hours after it was caught, where the chromatophores were contracted owing to pressure, and bathed them with .5-1 per cent. formalin, and found the chromatophores expanded considerably in less than three minutes. Physical irritation produced practically no result, and light none.

\* 'Philosophical Transactions,' 1894, "On the Coloration of the Skin of Fishes, especially of Pleuronectidæ," Cunningham and MacMunn.



# THE BIRDS OF THAT PORTION OF THE NORTH-EAST COAST BETWEEN TYNEMOUTH AND SEATON SLUICE, NORTHUMBERLAND.

BY J. M. CHARLTON.

(Continued from vol. xv. p. 380.)

**PINK-FOOTED GOOSE** (*Anser brachyrhynchus*).—Flocks of this species are seen and heard passing over, making parallel to the coast, in winter; but they have been well out of shot. As far as I am aware, all the grey Geese obtained here have been of this species.

**BRENT GOOSE** (*Bernicla brenta*).—Occasionally they pass over in small numbers during winter, but were formerly much oftener seen. A mature male was shot on Jan. 1st, 1894, and is now in the Hancock Museum. On Oct. 26th, 1909, an adult female was shot by a pitman at St. Mary's Island, and was procured from him by my brother. It is now in our collection. This is a very early date for this species to be seen on the Northumberland coast. This specimen seemed in a very poor condition, due no doubt to its being in the moult. It was making its way north when shot, and had evidently been blown out of its course by the rough weather prevailing at that time, and separated from its companions. The manner in which this specimen came into our possession is rather interesting. In the morning of the same day my uncle observed a Brent Goose flying slowly north close to the shore and informed my brother, who straightway set out for St. Mary's, in the hope of seeing others. When he arrived, a Brent was immediately shown him, which had been shot half-an-hour before from some butts formed in the sand-banks opposite the island. There seems every reason to suspect that this was the same bird as that observed at Cullercoats.

**[MUTE SWAN (*Cygnus olor*)].**—About fifteen years ago a bird of this species escaped from Shields Park, and was observed for some time near St. Mary's Island. Eventually it was captured

by a fisherman and taken back to the park. Although this was not a wild bird, yet it is as well to mention it, in order to prevent any misunderstanding as to its true history.

WHOOPEE SWAN (*Cygnus musicus*).—A flock occasionally passes on migration in autumn and winter. Mr. C. M. Adamson says: "On Jan. 22nd, 1838, whilst at Hartley with Mr. Hancock, during a very long and severe storm, eight of these magnificent birds came over our heads flying north; when shot at they commenced to make their peculiar cry, probably in derision. They were all white birds." My father shot an adult male in December, 1892.

SHELD-DUCK (*Tadorna cornuta*).—A not uncommon visitant, generally in autumn and winter. Flocks of from twenty to forty birds have occasionally been seen. I am informed by Mr. H. Hodgson that he once saw one hiding among some seaweed with its head buried beneath it. It had been shot at by him and had evidently been wounded, and was trying to hide from its pursuers. In Turner's 'Pliny and Aristotle on Birds' there is mention made, in the commentaries, of a certain island of Tina, probably on the Northumberland coast, and it is stated that Sheld-Duck bred there. The first edition was published in 1544; there have been two editions of this book since, the last by A. H. Evans in 1902 at the Cambridge University Press. The editor of this last states in a footnote with reference to this "Tina": "Possibly St. Mary's or even Coquet Island." I have had communication with Mr. W. W. Tomlinson, one of the best authorities on this district, and he says that at that time there was a small church on the island, by name St. Mary's, the origin of the island's name, and also that it was then very probably not an island at all but connected with the mainland, since it is only disconnected now at high tide. As I do not know what authority Mr. Evans has for referring Tina to St. Mary's Island, other than that the name evidently refers to an island situated near the River Tina (Tyne), I can make no definite statement; but I should doubt that Turner meant St. Mary's Island. Turner was well acquainted with this coast, however, as is shown in his mention of the Cormorant nesting at the mouth of the Tyne.

MALLARD (*Anas boschas*).—Occasionally seen; commonest in

January, when I have observed as many as twenty or thirty in a flock. Soon after the lighthouse was installed at St. Mary's Island, two of these birds were killed by striking the tower during the night.

SHOVELER (*Spatula clypeata*).—A very rare winter visitor, of which I have but two records—an immature male shot at St. Mary's Island on September 12th, 1882, by Mr. R. Duncan, and a female shot at the mouth of Seaton burn in 1900. The latter was termed a "Spoonbill" in the neighbourhood.

TEAL (*Nettion crecca*).—Formerly common in winter, at which time Mr. Duncan informs me he has seen large flocks. Now but seldom seen. The first record is a young male shot on Oct. 16th, 1834, at St. Mary's Island.

PINTAIL (*Dafila acuta*).—The only record I have of this species is an adult male shot between the island and Seaton Sluice, about Dec. 10th, 1909.

WIGEON (*Mareca penelope*).—A winter visitant, formerly of regular occurrence but now seldom seen. Large numbers occasionally resorted to the reservoir at Whitley Dene in former years.

POCHARD (*Fuligula ferina*).—A very rare winter visitant. It has occurred twice on Whitley Old Reservoir, once in 1903 and again in 1904.

TUFTED DUCK (*F. cristata*).—A winter visitant of uncommon occurrence. I have observed it feeding in the lake in Tynemouth Park near the tame ducks.

SCAUP-DUCK (*F. marila*).—Formerly a regular and fairly common winter visitor, now of irregular occurrence. The first record is dated winter of 1838 (Hancock Museum); and Mr. C. M. Adamson, referring to this species, says: "The winter of 1837 and 1838 was a great year for Scaups on this coast. On Jan. 22nd, when with Mr. Hancock, we saw a great quantity at St. Mary's Island. The old drakes seemed to keep in small flocks by themselves, perhaps three or four together. The young birds appeared to be in large flocks." At the beginning of March, 1911, a male arrived on Whitley Reservoir, and remained there until April 9th, 1911. It was usually to be seen swimming up and down in the centre of the water, which is about one hundred and twenty yards in breadth and two hundred and

thirty yards long. It was in splendid plumage, and as far as could be discerned had no physical ailment. I watched it closely for ten days through glasses. At irregular periods of the day it dived for food, giving a kind of shoulder thrust as it did so, and remaining under exactly thirty seconds every time. It was particularly jealous of the too close approach of the other feathered inhabitants of the water—four Dabchicks, a female Mallard, and two Waterhens—and when they approached, it swam up and chased them away. Occasionally it went on shore and sat on some half-submerged grass-banks. On April 9th a dark bird, undoubtedly a female, arrived from the south at about 1.30 p.m., and settled beside the male. They swam about for some time, then the female rose, the male following, and they circled round several times, the former ultimately departing in a northerly direction; the male, however, returned to the water. The following morning he, too, had departed.

**GOLDEN-EYE** (*Clangula glaucion*).—An occasional winter visitor. On Jan. 2nd, 1906, a large flock was observed at St. Mary's Island, all the birds being immature or females. Males in adult dress are very rare; my brother observed one on Oct. 26th, 1909.

**LONG-TAILED DUCK** (*Harelda glacialis*).—A very rare visitor in winter. I can find but three records. An immature male changing to summer plumage was shot off Seaton Sluice on Jan. 15th, 1894, and is in the Hancock Museum. Mr. R. Duncan informs me that he saw the second specimen shot when it was coming through the passage at St. Mary's; it was a female. Two birds shot by a Mr. Marshall off Cullercoats, and set up by Mr. Taylor, are now in the possession of Mr. Gascoyne of that village.

**EIDER DUCK** (*Somateria mollissima*).—Although its nesting-haunts are so close—the Farne Islands—yet but few specimens have occurred, and these immatures, and from this we may gather that this species does not shift its quarters much. The following are the only authentic occurrences. An immature male shot at St. Mary's, and now in the Hancock Museum. From Jan. 29th to Feb. 14th, 1908, I observed an immature female swimming in Cullercoats Bay during heavy storms. It frequently dived and brought seaweed to the surface, which it



sifted with its bill; subsequently it was shot and found to be lacking of an eye, which accounted for its prolonged stay, and also for our observing it being knocked over by the waves. Another was shot at St. Mary's in January, 1911.

COMMON SCOTER (*Eidemia nigra*).—A fairly common visitor in winter. My brother observed an enormous flock of Scoters in October, 1909; they were swimming north, and all dived simultaneously, rising some thirty yards ahead and swimming for some distance, then diving again. They seemed to be following a shoal of small fry. A favourite haunt is opposite the mouth of the Seaton Burn, where sometimes several small flocks can be seen. Here they feed on the food washed down by the stream, and also on the large variety of the crustacean fauna which is, according to various authorities, particularly abundant here, owing, as one writer states, to the quantity of algæ on the rocks ('Transactions of Northumberland and Durham Natural History Society').

VELVET SCOTER (*E. fusca*).—A winter visitant of rare occurrence. I have only two records: Mr. Taylor informs me that one was shot at Whitley in 1905; four birds were observed by my brother and I near the mouth of the Seaton at Holywell Burn on Dec. 14th, 1910; several flocks of Common Scoters were also present, but the rarer species kept apart from them and were very wild.

RED-BREASTED MERGANSER (*Mergus serrator*).—An occasional visitor in winter. A male was shot at Hartley on Jan. 25th, 1838. My father procured an adult female from a fisherman who had shot it in October, 1892; and another, also a female, was shot in November, 1909, and purchased by my uncle. Both of these are in our possession.

GOOSANDER (*M. merganser*).—An exceedingly rare visitor in winter. I have been informed by several observers that specimens have been shot at St. Mary's Island, but have not examined any of them, and think that they very probably were of the former species. There is, however, one definite record, an adult male in summer plumage, in the early spring of 1880, which was shot by Mr. J. Ewen at St. Mary's Island, and considered by him to be a Hooded Merganser (*M. cucullatus*), being recorded as such by W. W. Tomlinson, Esq., in his history of this district.

I have interrogated Mr. Ewen on the subject, and there is no room for doubt that the bird in question belonged to this species, namely, *M. merganser*.

WOOD-PIGEON (*Columba palumbus*).—An uncommon resident, breeding sparingly in Holywell Dene. In autumn numbers of foreign birds arrive on the coast and pass inland.

STOCK-DOVE (*C. ænas*).—I am informed by Mr. Hodgson that a bird of this species was shot near the Convalescent Home at Whitley Bay in 1906 and examined by him.

ROCK-DOVE (*C. livia*).—Authentic specimens have occasionally been obtained on migration, but much confusion is apt to arise owing to the fact that numbers of domesticated Pigeons frequent the coast.

TURTLE-DOVE (*Turtur communis*).—A very rare spring visitant. Mr. H. Coxon has in his collection an adult male shot on Seaton Burn (Holywell) on May 19th, 1888, which is the only record.

PALLAS'S SAND-GROUSE (*Syrhaptes paradoxus*).—During the great irruption of Sand-Grouse in the spring of 1888, a small flock of some seven or eight birds were observed on the sand-hills near St. Mary's Island. This was on May 20th, and shortly before, about 10th, a party had arrived at Holy Island, further north, being the foremost of the great movement south along the coast. Mr. J. Ewen, who was then in residence on the island, went out and procured two males, which were afterwards very finely set up by Mr. R. Duncan. This flock remained for several days, but eventually passed on south. In the 'Newcastle Weekly Chronicle' for June 23rd, 1888, Mr. R. Duncan recorded a female which was captured during a storm on board the steam-trawling boat 'St. Oswin' when at sea about forty miles off Tynemouth. This was early in June, and the bird lived for some time in an aviary in the Northumberland Park, North Shields. (The above is recorded by George Bolam in an excellent paper on the "Irruption of Sand-Grouse in 1888 in Northumberland," 'Berwickshire Naturalists' Club Transactions'). This bird laid two eggs in confinement shortly after its capture, one of which is in the collection of Herbert Coxon, Esq.

PHEASANT (*Phasianus colchicus*).—Sometimes one strays into

Holywell Dene, but only very occasionally. One was shot in the winter of 1909 by F. Wilson, Esq., on his farm, Marden, Cullercoats. Many of the pitmen have specimens set up, obtained at Holywell.

COMMON PARTRIDGE (*Perdix cinerea*).—Formerly a common resident. Mr. R. Duncan informs me that about thirty years ago he saw a very large covey leave the mainland and fly round the island. Now they are very uncommon. A stray pair or two may breed, but a certain notice-board I know of in the district which says, "The shooting rights on this land are let, anyone found disturbing the game and trespassing will be prosecuted," seems rather ironical. My uncle, Mr. S. G. Charlton, informs me that a covey once flew from the mainland, being forced by the violence of a west wind, and, alighting on the sea, were drowned and washed to shore, where they were picked up by the fishermen. This took place about ten years ago along Whitley Sands. Mrs. Leeson tells me that several times in the summers of the last three or four years she has heard Partridges calling in the fields close behind her house in Beverley Gardens, Cullercoats, where they doubtless nest.

QUAIL (*Coturnix communis*).—Formerly a summer resident; J. Hancock says that it has nested at Cullercoats, among other places in Northumberland. The only occurrence I know of in recent years is one which was shot near Holywell by Mr. Richardson in June, 1906.

LAND-RAIL (*Crex pratensis*).—A regular spring visitor, but only in small numbers. Mr. Monk informs me that one was caught by him which had flown against the plate-glass of the lighthouse on St. Mary's. Mr. Richardson tells me that formerly the pitmen of Holywell made up small parties on the arrival of the Corn-Crakes, and sallying forth with guns and an instrument for imitating the bird's calls, went in search of them. When the "sportsmen" came to a field in which they heard the Corn-Crakes calling they entered it, and two or more standing ready with their guns, the remaining man worked the decoy. Very soon the real calls ceased, and the gunners waited; then suddenly a small brown form darted from the grass and all the guns were let off simultaneously at it. Sometimes they got as many as four or five out of one field, which

of course depended upon the time of year, for they are only to be seen in numbers like this either directly on their arrival in spring or preparatory to their departure in autumn.

**WATER-RAIL** (*Rallus aquaticus*).—An uncommon winter visitor. I have established proof of four specimens, but probably others have occurred. One, a male, shot on Nov. 12th, 1895, near Tynemouth; a second, of the same sex, a remarkably plump bird, caught by my fox terrier "Tiney" at Briar Dene on Jan. 4th, 1906; a third, shot at St. Mary's Island by a Mr. Watts during stormy weather in the autumn of 1907; the fourth and last was picked up at the same time as the second, near Cullercoats Station; it was lying beneath the telegraph-wires, against which it had killed itself.

**MOOR-HEN** (*Gallinula chloropus*).—A fairly common resident. It breeds at Whitley, Briar, and Holywell Denes.

**COOT** (*Fulica atra*).—A very occasional visitant in winter. Mr. W. G. Monk, sometime lightkeeper on the island, informs me that during his stay there, which was between 1898 and 1905, he caught two Coots on the lighthouse. They had probably been driven to the coast by hard weather and the freezing of ponds and marshes inland. Another was shot in about 1904 at St. Mary's, and was set up by Mr. Richardson; the last record is of one shot at Whitley Bay in December, 1910.

**DOTTEREL** (*Endromias morinellus*).—One was shot in the fields at Cullercoats in 1896.

(To be continued.)



## SUPPLEMENTARY FISH-NOTES FROM GREAT YARMOUTH.

BY ARTHUR H. PATTERSON.

SINCE the publication of my Annual Report in the December 'Zoologist' (1911, p. 441), I have received one or two other items of piscine interest.

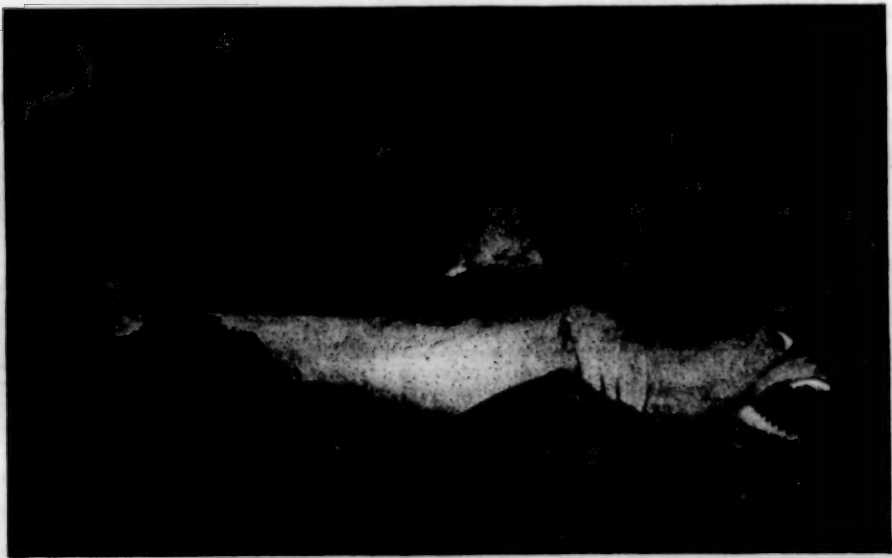
SUNFISH AT SHERINGHAM.—Thanks to the good offices of a Sheringham gentleman, Mr. R. Funnell, I have received a description of the stranding of a short Sunfish (*Orthogoriscus mola*) off the north-east Norfolk coast. It was washed ashore on Nov. 26th, having undoubtedly succumbed to the buffetings of the severe gales prevailing at that time. The length was 5 ft., the extended dorsal and anal fins measuring 6 ft. 2 in. from tip to tip, each fin being 22 in. long. What became of it my correspondent did not state.

PORBEAGLE GAFFED.—Two sea-anglers, when fishing from a boat in the roadstead off Yarmouth on Nov. 29th, observed what they at first thought to be a log floating on the surface of the sea, but when it turned and came against the tide they at once concluded it must be something alive. They hastily pulled up their anchors and gave chase, their movements being apparently unnoticed by the fish, which had evidently been in grief either by stress of weather or by contact with fishing-nets. With a quick jerk a gaff-hook was made fast to the fish, and a lively ten minutes followed. They eventually got it into the boat, and to their surprise they found it a young Shark, with a goodly array of vicious-looking teeth. I afterwards saw it, and found it to be a Porbeagle Shark (*Lamna cornubica*) about 4 ft. in length. (See illustration, p. 30.)

HALF ALBINO PLAICE.—On Dec. 5th I saw exhibited on a fishmonger's slab a very attractive-looking Plaice, some 16 in. in length. The anterior half of the upper side was of the normal colour, with the usual orange spottings, the posterior

portion being white, with a peculiarly porcelain-like appearance. Half of both the dorsal and the anal fin was white also, with an inclination to pinkiness here and there; a spot like an ink-blot was observable at the base of the caudal fin.

DEFORMED CODLING.—Late in November a sea-angler hooked a codling of some 3 lb. weight. The huge head covered exactly a third of the entire length, the body being stunted and twisted in a remarkable manner. Viewed from above, the fish had a lateral twist behind the dorsal fin, suggesting the letter "S," and when examined in profile the body from the dorsal fin



PORBEAGLE SHARK (*Lamna cornubica*).

followed a half-circular bending, the tail-end being in a line with the anterior portion, the tail itself taking half a right angle bend downwards. The third dorsal and the second anal fin most conveniently fitted into the angles. I made an incision in the side of the fish, finding the vertebræ much pushed together or coalesced, forming almost a solid mass of bone. The creature was in good condition and thoroughly healthy, but I could not muster up sufficient courage to have it cooked for the table. From what I have seen of deformities among fish I have observed that the Codfish is more susceptible to malformation than any other species.

**THE HERRING HARVEST.**—The Herring fishing of 1911 will be remembered as a very heavy one, the catches brought into the harbour and at Lowestoft beating all previous records; what it would have reached had not there been such frequent spells of stormy weather can only be conjectured. Some great gluts occurred; on one occasion salt ran out, and the fisher-folk were put to great inconvenience. Southwold had a season that was decidedly discouraging. Practically the Herring season came to an end by Dec. 9th, although a few fish from odd boats had been landed for some days after. During the week ending Dec. 16th only about 800 crans, roughly, came in. Seven boats arrived on the 13th with thirty crans (three lasts) between them, which realized £2 7s. per cran. The total delivery of Herrings at the fish-wharf for the fishing up to Wednesday (13th) was 492,860 crans; on the Gorleston side of the river some 52,882 crans were landed—a total of 545,742 crans, as compared with 347,240 crans at the same date of last year, and 439,580 crans in 1909. At the time of writing the shipment of pickled Herrings had not yet ceased. Up to this date (Dec. 16th) no fewer than 394,598 barrels and 126,879 half-barrels had been despatched by steamers, both British and foreign, some one hundred and one vessels in all, without counting many freights of salted and iced Herrings taken to the Continent by sailing craft, and huge train-loads despatched by rail. It has been well said that “of all the fishes in the sea, Herring is King!” The fishermen generally have taken up good shares for the voyage, but owners have sustained heavy losses of nets.

**GLUT OF MACKEREL.**—Some remarkable catches of Mackerel were landed in November, the breezy weather absolutely suiting this frolicsome fish. I was much interested, when visiting the wharf on Sunday afternoon (November 26th), at seeing a Lowestoft drifter, the ‘John Alfred’ (fishing with Mackerel-nets), lying there with no fewer than six lasts of Mackerel aboard her (sixty thousand fish!). The crew were making all snug (the nets being stowed on deck for want of room below), with a view to starting for Billingsgate Market at dusk. I understand the fish there realized a large figure, certainly much more than they would have done had they been sold next day at Yar-

mouth. During the following week, and on to early December, huge hauls were made, and on more than one occasion the wharf was practically "choked" with Mackerel.

I do not know whether I am correct, but I have an opinion that we have two races of Mackerel visiting the coast in the late autumn, one of them being a shortish and more compact fish, approaching in build to the Bonitos. Its colourings are the same as the typical Mackerel. I noticed these from time to time washed up on certain tides, and surmised that from their more triangular head, broader at the base, they were more prone to fall from the meshes of the nets. I give this opinion for what it is worth, and intend next year to make measurements and other observations.

PILCHARDS LANDED.—On Dec. 12th the steam drifter 'Bono,' which had gone south and been fishing in the Channel, brought in twenty-four crans of "bloater stuff"; she also landed between six and seven crans of Pilchards, which sold for 22s. 6d. a cran. Prior to that catch she had shot seventy-seven nets for seven hours, the result of the haul being a solitary Pilchard. The arrival of the Pilchards made some excitement on the wharf, this species coming but rarely nowadays into the Herring area, whereas in years gone by it was by no means uncommonly caught. The Pagets, in their 'Sketch of the Natural History of Yarmouth' (1834), wrote:—"Some few generally taken every year in the Herring-nets; in some years they have been abundant, as in 1780 and 1790, and in 1799, when so many were taken, that one 'tower' [a hand on board the boat] received upwards of a last as his perquisite." Sir Thomas Browne remarked that, "though the sea aboundeth not with Pilchards, yet they are comonly taken among Herrings, but few esteeme thereof or eat them."

I did not ascertain to what destination or process the Pilchards above referred to were assigned; they are so tender and oily that they make indifferent "smokers," the head and body having a tendency to separate when on a "spit" curing. Nevertheless, I was given one which had been with others slightly smoked as a novelty. I found it very fat but palatable, with a suggestion of piquancy that is not noticed in a Herring. I should say that for the purposes of preserving in olive oil it is better adapted.



## NOTES AND QUERIES.

## MAMMALIA.

**Habits of Dormouse.**—If any reader of 'The Zoologist' keeps tame British Dormice, I should be very grateful for notes on several points in their economy, in regard to which I need information for completion of my article on this species in my 'History of British Mammals.' In particular, I want a description of the first pelage of the young and the date at which it is cast; also I want, for the wild animals, records of midsummer births, *e. g.* in July and early August, and details as to the usual position of the winter or hibernatory nests. There are other questions in regard to which I should much like to correspond with anyone sufficiently interested. — G. E. H. BARRETT-HAMILTON (Kilmanock House, Campile, Ireland).

## AVES.

**Nesting of the Tree-Creeper (*Certhia familiaris*).**—I have this year (1911) succeeded in attracting this bird to nest behind a piece of virgin cork nailed against a depression in the bark of a lime-tree about five feet from the ground. I can also recommend a piece of virgin cork nailed against a tree or wall in the form of a cup as an attractive nesting-place for the Spotted Flycatcher. The Tree-Creeper makes up the number of nesting species of birds in my grounds to forty-six, which I think is a good average, considering I have no pool or stream here.

List of forty-six species of birds that have nested at Rosehill, Cheadle, Staffordshire:—Mistle-Thrush, Song-Thrush, Blackbird, Redstart, Redbreast, Whitethroat, Blackcap, Garden-Warbler, Goldcrest, Chiffchaff, Willow-Wren, Wood-Wren, Hedge-Sparrow, Great Titmouse, Coal Tit, Wren, Tree-Creeper, Pied Wagtail, Tree-Pipit, Meadow-Pipit, Spotted Flycatcher, Swallow, House-Martin, Sand-Martin, Greenfinch, House-Sparrow, Tree-Sparrow, Chaffinch, Linnnet, Bullfinch, Yellow Bunting, Starling, Jay, Magpie, Jackdaw, Rook, Green Woodpecker, Cuckoo, Tawny Owl, Sparrow-Hawk, Kestrel, Wood-Pigeon, Pheasant, Partridge, Corn-Crake.—JOHN R. B. MASEFIELD.

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**Nutcracker (*Nucifraga caryocatactes*) in Suffolk.**—A female Nutcracker was shot at Beyton on Nov. 10th, 1911, and brought to me the same day. It is one of the slender-billed race which is believed to inhabit Siberia, and was in good condition. The gizzard was full of what appeared to be acorns bitten into small fragments. I cannot find any reference to the curious tongue of this bird, which is bifurcated, exactly fitting into a small knob in the lower mandible, dark in colour, and rather like a turnip-seed. At least two others have been obtained in East Anglia, which will doubtless be duly recorded in this Journal.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds, Suffolk).

**Golden Eagle (*Aquila chrysaëtus*).**—*Re* Mr. Robert Warren's note (Zool. 1911, p. 391), the enclosed cutting from the 'Essex County Chronicle,' Nov. 17th, 1911, and the 'Maldon Advertiser' may be of interest:—"A splendid specimen of the Golden Eagle, now very rare in the British Isles, has died this week in captivity at Rayleigh Mill, Maldon. The bird, a hen, was the property of Mr. Porter Garratt. It is known to have been at least sixty-seven years old, and it was with the family of Mr. Garratt for the greater part of this period. The bird was most ferocious, and would not allow anyone to enter its aviary, and when it was removed from its previous home at Woodham Walter to Maldon it had to be caught in a pig-net. It laid two eggs each year, and these (after each member of the family had preserved a specimen) were sold and eagerly sought after by a London dealer at twenty-five shillings each. After the eggs were laid they were replaced by hen's eggs, and some of these were hatched by the Eagle, but many of the chicks met an early death by being trampled on by the Eagle. A pair of chickens, however, were reared on one occasion, and were treated by the foster-mother in a most affectionate manner, although one of the birds, a cockerel, was a very fierce fellow. For these birds the Eagle would readily leave its food, and allow itself to be driven away by the cockerel. The Eagle has been sent to a taxidermist to be preserved."

I knew the Eagle well for the last thirty years, and blew the first lot of eggs—ten or a dozen—that had been kept in a drawing-room cabinet; she laid one the first year, and then three or four a year, so some of my eggs were pretty old, and somewhat of a trouble to wash out clean. Altogether she laid about twenty-five eggs, all at Hoe Mill, Woodham Walter; none since she has been moved to Maldon. Mr. Porter Garratt sold six eggs to Mr. H. M. Wallis, of Reading (a contributor to 'The Zoologist'), for twenty shillings each. The

chickens were hatched in 1895, and the hen kept with her till the next spring, when both would sit on the same nest, and the underneath one (hen) had to be taken away. The cockerel that was let out was terribly fierce, and his sister (Miss Garratt) told me that after it (the cock) had killed all the rats at the mill it then killed the cats that used to help catch them, but I cannot further confirm. The Eagle belonged to Mr. Garratt, miller, of Hertford, then to his brother, Samuel Garratt, of Hoe Mill, and then his son Porter. Was believed to be bought at Leadenhall Market sixty-seven years ago.—EDWARD A. FITCH (Brick House, Maldon, Essex).

**Long-tailed Duck breeding in Orkney.**—I read this record in 'The Zoologist' (1911, p. 432) with much interest, and I sincerely hope that Mr. O. V. Aplin will come forward with *definite* proof that *Harelda glacialis* has really bred in Orkney during the summer of 1911. Such a statement as Mr. Aplin makes is valueless without definite proof. For the last three years, to my certain knowledge, a few Long-tails have remained behind on Loch Stennis during the whole of the summer, but I never dared to assume that they bred there, thinking them rather "pricked" birds unable to perform the spring migration north. Again, I would urge Mr. Aplin to give definite proof, and so establish the fact that the Long-tail does breed in Orkney, because it has been suspected of breeding there for many years, and to have the matter definitely settled would be extremely satisfactory. Should no more proof be forthcoming than what at present is before us, I am afraid the record cannot be accepted.—F. W. SMALLEY (Challan Hall, Silverdale, Lancashire).

**Habits of the Coot.**—Referring to the reported *early* migration of the Coot (*Fulica atra*) (Zool. 1911, p. 433), the fact should not be overlooked that this is a very prolific bird. Its breeding period covers several months, although it is perhaps difficult to say how many broods a pair of Coots would actually bring up in the season. Given sufficient cover early in the spring, the Coot appears to be an early breeder, and it certainly may be found breeding quite late in the summer, though whether the same individuals would go on breeding all through the season I have not sufficient information to say. There is a record of three nests (eight, seven, and six eggs, the first considerably incubated) on March 24th, 1890; a nest of nine eggs, incubated, on March 31st, 1891; and a nest of two eggs on March 21st, 1893 (Zool. 1893, p. 191). In the 'Field' of April 25th, 1891, there is a record of a brood of young seen on April 10th; and

young could fly by April 26th, 1902 (Zool. 1903, p. 127). To turn to the other end of the season: on July 6th, 1900, I found a nest of five eggs slightly sat upon, and another containing one fresh egg; on July 2nd, 1903, four nests, each with five eggs; and on July 16th, 1906, a nest with four fresh eggs, and another with six slightly incubated. As late as July 19th in 1885 a Coot was sitting on her nest, and on Aug. 11th, 1883, there were young Coots of all ages, including at least one small downy young one with the reddish head. The Coot is said to lay from seven to ten eggs, although my experience has been that in some places at all events five is a common clutch. If we put the average clutch at six and suppose (I can only suppose) that the Coot rears three broods in a season, ten pairs of Coots in a favourable locality (where their eggs were safe from Crows and their young from Pike) would increase enormously by the end of September.—O. V. APLIN (Bloxham, Oxon).

**Wood-Sandpiper (*Totanus glareola*).**—Mr. George Bolam's reference to Wood-Sandpipers in his note (Zool. 1911, p. 432) is interesting to me, because I am responsible for putting on record (subject to correction) a party of five at a reservoir near Hebden Bridge (Yorkshire, West Riding) on Aug. 12th, twelve days before Mr. Bolam saw his birds. Though my mind was made up before leaving the reservoir, to make assurance doubly sure, my friend Wm. Nowell, who also saw the birds, inspected mounted examples and also a large number of skins of this species at South Kensington a day or two afterwards, and informs me that he saw nothing to lead him to think that I have made a mistake. I find great difficulty in persuading Yorkshire ornithologists (admittedly with more experience than I) to accept my record, presumably on the ground Mr. Bolam mentions, *i. e.* the close resemblance of Wood and Green Sandpipers. Personally, I believe the similarity to be exaggerated. At any rate, Green Sandpipers our birds were certainly *not*. I should be glad if somebody well acquainted with the Wood-Sandpiper would describe the appearance of the back and wings as the bird is flying away from an observer. A very striking effect was produced by the flight of our birds, which, of course, cannot be seen by examining an unrelaxed skin.—WALTER GREAVES (Hebden Bridge).

**Glaucous Gull in Co. Mayo.**—On the 23rd of last December my friend Mr. Claud Kirkwood, of Bartragh House, shot an immature specimen of *Larus glaucus* in its first year's plumage. It had been observed for some days haunting the island. — ROBERT WARREN (Ardnaree, Monkstown, Co. Cork).



**Gulls hawking for Insects.**—With regard to Mr. Collingwood Ingram's note (Zool. 1911, p. 433), it may interest him to know that what he saw on Sept. 12th is also seen here in North Lancashire every year. When the male (flying) ants come out in August in their millions, the Black-headed Gulls and Starlings hawk for them just as Mr. Ingram describes. How the Gulls know the ants are about I cannot say, but as soon as the ants appear we have the Gulls also flying round in great numbers and feeding on the insects. I may say, in conclusion, that when the ants come out they do so in incredible numbers. I have known the windows of the houses to have to be kept shut, otherwise it was a case of taking a sweeping-brush and sweeping out the dead and dying ants from the rooms. I have seen the lake here literally covered with dead ants, and the air full of Gulls, Starlings, Swallows, Swifts, and Martins feeding on those still flying about. I consider it is no unusual method of feeding on the part of the Black-headed Gull, and I am certain they frequently not only "hawk" for flying ants, but for moths and other insects as well.—F. W. SMALLEY (Challan Hall, Silverdale, Lancashire).

**Causes of our Rare breeding Birds disappearing.**—In 'The Zoologist' (1911, p. 435), Mr. F. C. R. Jourdain, commenting on my statements (*loc. cit.* p. 391), says "he holds no brief on behalf of the trading collector, and, without knowing anything of Mr. Warren's correspondent, will *undertake* to say that there is not a single British-taken egg among the fifty duplicate Ospreys' eggs of which he writes." This is a bold statement to make of unknown dealers. What evidence can he produce that enables him to give such a sweeping undertaking? He also states:—"In the first place, it is a well-known fact that the Golden Eagles of Scotland have enormously increased in numbers, in spite of a certain amount of egg-taking, because the old birds are not shot down now on many of the deer forests. On the other hand, the Osprey is on the verge of extinction, but, as Mr. Warren must be aware, this is due to the wanton slaughter of the birds on migration through Ireland, and not to egg-collecting at all. How many clutches of British Ospreys have been taken of late years? Yet eyrie after eyrie is deserted in spite of strict protection, and simply because one or both of the birds have been barbarously murdered, either on their way south after the nesting season, or moving north in the spring, to be finally recorded in the pages of the 'Irish Naturalist.'" Now, I should like to hear the evidence that enables Mr. Jourdain so positively to state that the decrease of the Osprey is caused by their slaughter when on migra-

tion through Ireland. What evidence can he produce that the Ospreys shot in Ireland were of Scotch origin, while those shot in England were Scandinavian-bred birds? Can he say with equal confidence that the near extermination of the Kite in Wales is not caused by the action of egg-dealers and collectors? With regard to the alleged slaughter of the Ospreys on their passage through Ireland, and recorded in the pages of the 'Irish Naturalist,' I have taken a period of eleven years, from 1900 up to the past year (1911), and, having taken the trouble to examine the pages of that journal for the period named, can only find *two* references to Ospreys—one in the index for 1908; but, although the words, "Osprey in Co. Sligo in November," occur, I can find *no notes* connected with the index in any of that year's numbers. The second reference to the Osprey is in the year 1909, when a Mr. Henderson writes that, when fishing on Lough Arron, he and his friend "saw an Osprey hovering over the lake for some time, and then disappeared." So for the *eleven years* there is no record in the 'Irish Naturalist' of any slaughter of Ospreys! No one can regret and reprobate the destruction of our rare breeding birds more than I do, but while the dealer's and collector's trade flourishes, what can be done? A few days ago I received a letter from an English dealer, asking me to exchange duplicate eggs, especially those of the *Falconidæ*. I gave him my usual reply, and forwarded the letter to the Royal Society for the Protection of Birds, London, so that they might keep this dealer under observation.—ROBERT WARREN (Ardnaree, Monkstown, Co. Cork).

#### REPTILIA.

**Occurrence of Small Red Viper in North Devon.**—In June, 1908, I captured a specimen of *Vipera berus* (var. *rubra*), which Dr. Leighton regards ('British Serpents,' p. 206) as a valid species. I was walking in the Valley of Rocks, Lynton, at the time, and noticed the Viper sunning itself. I put my foot on it, and then passed a piece of string around its tail. At the end of the string's length the reptile was easily swung against a stone wall and apparently killed; but, on pulling it out from my pocket some time later on returning home, I was frightened to observe that the animal was very much alive, coiling itself up on the floor and hissing furiously. Luckily, the string was still attached, and the snake was finally despatched with a penknife. It measured  $10\frac{3}{4}$  in. in total length, the tail being  $1\frac{1}{4}$  in. Stomach empty. The zigzag marking was of a beautiful brick-red colour. Not much, apparently, is known regarding the distribution of this snake.—BRUCE F. CUMMINGS (Barnstaple).

## PISCES.

**Flight of the Flying-fish.**—For the last three months I have been crossing and recrossing the various areas of ocean where Flying-fish are seen, in many places in countless thousands. After most carefully watching their flight, both with the unaided eye and also with a pair of Zeiss binoculars, I have come to the conclusion that the impetus which makes a long and sustained flight possible is the initial beating of the wings, which move so rapidly that, except by the splash they make upon the surface as they gradually rise clear, these cannot be made out. When they are vol-planing, as they often do for long distances, then the opalescent sheen of the wings which are held horizontally are most noticeable, and have given many people the impression that the elongated membranous fins are only used as the planes of a motor-driven aeroplane. Another point was lately impressed upon me whilst closely watching them, and this was the great effect the movements of the tail have upon the flight, aided no doubt by the smaller posterior wing-like fins acting as a guiding rudder. Before they fall clumsily into the water, it is often to be seen that their wings, *i. e.* the large anterior pair, are raised forty-five degrees from their previous horizontal plane. I can testify to the fact that they are nice eating. Those seen off Madagascar seemed much larger than those I saw off the Island of Socotra. One rose high enough to land on the hurricane-deck of a P. & O. steamer I was on board, twenty-five feet above the water; they often hurl themselves on to the well-deck of vessels, and electric light on board seems to have a fatal fascination for them at night. The popular idea seems sound, that they mistake a ship for some gigantic dolphin, whose favourite food they appear to be.—PERCY RENDALL (Blackheath).

## CRUSTACEA.

**The Brine Shrimp (*Artemia salina*) bred from Tidman's Sea-salt.**—With reference to Dr. Calman's exhibit at the meeting of the Zoological Society of London, held on June 27th last, mentioned in 'The Zoologist' (1911, p. 280), perhaps I may be allowed to state that specimens of the Brine Shrimp, bred from Tidman's sea-salt, were exhibited by me at a meeting of the Royal Physical Society of Edinburgh on Feb. 28th, 1910. Of three boxes of the salt examined only one yielded *Artemia* eggs. It would be interesting to know where this salt comes from. Perhaps some reader of 'The Zoologist' can tell us.—WILLIAM EVANS (Morningside Park, Edinburgh).

IN reply to an enquiry, Messrs. Tidman & Son informed me some time ago that their salt is "made abroad, direct from the sea, entirely by solar evaporation, without the application of any artificial heat." I have also heard that salt manufactured at Trepani, Italy, and imported into Norway for the purpose of fish-curing, has been found to contain living eggs of *Artemia*. The occurrence of the crustacean in the "salterns" or brine-pans of salt-works is, of course, well known.—W. T. CALMAN.

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### EDITORIAL GLEANINGS.

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"PLATO's story about the submerged continent of Atlantis has again cropped up, this time with some scientific evidence in its support. M. Louis Germain, in a recent communication to the French Academy of Sciences, draws attention to the existence in Quaternary strata in Morocco of many fossil molluscs, including the *Helix graveli*, Germain, of the same species as are still extant in the Azores, the Canaries, Madeira, and the islands of the Cape Verd archipelago. From this and other evidence of the same nature he deduces the sinking under the sea of a continent once extending from these islands to Morocco, and gives reasons for thinking that the submersion took place in late Pliocene times. It may be so; but from the Pliocene Age to that of Plato is a long time, and by whom was the tradition handed down?"—('The Athenæum,' January 13th, 1912.)

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THE Second International Congress of Entomology will be held at Oxford from August 5th to 10th, 1912, and not as previously announced. The President of the Congress is Prof. E. B. Poulton, D.Sc., F.R.S. All communications and enquiries should be addressed to the General Secretary of the Executive Committee, Dr. Malcolm Burr, c/o Entomological Society of London, 11, Chandos Street, Cavendish Square, London, W.

